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TRANSLATOR'S AFFIDAVIT

I, Herbert Dubno, a citizen of the United States of America, residing in Bronx (Riverdale), New York, depose and state that:

I am familiar with the English and German languages;

I have read a copy of the German-language document attached hereto, namely PCT/EP02/14551; and

The hereto-attached English-language text is an accurate translation of the above-identified German-language document.

Herbert Dubno

Sworn to and subscribed before me
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T R A N S L A T I O N

DESCRIPTION

ROLL SYSTEM, PARTICULARLY A CONTACT ROLL SYSTEM OF A WINDING MACHINE

Technical Field

The invention relates to a roll system, especially a contact roll system, for a winding machine having a multiplicity of roll segments which are journaled adjacent one another end face to end face for free rotation and are movable perpendicularly to their rotation axis and to a winding machine for winding up a traveling web of material, especially a paper web or a web of plastic foil or film, which contains the roll system as a contact roll system.

State of the Art

In winding machines for the winding up of continuous traveling webs of material, especially paper webs or webs of plastic foil or film, contact rolls are used in a known manner as pressing rolls or squeezing rolls, especially in the case of high winding speeds, to prevent the incorporation of air into the wound roll as much as possible. When the winding machine is used for winding up a web of material which has been subdivided by

longitudinal cuts into a plurality of wound rolls which are to have cores or sleeves on which the rolls are wound and which are contiguous or flush with one another, the contact roll for each wound roll must be individually movable to compensate for unavoidable diameter differences in the wound rolls. The axial length of a contact roll must thus be equal to or greater than the width of the wound roll against which it presses.

DE 198 05 412-A1 and DE 198 48 532-A1 describe an advantageous roll system of the type which has been described in which each roll segment is held in a frame which is mounted so as to be movable perpendicularly to the rotation axis. Each frame of a roll segment contains two bearing plates which extend laterally and parallel to the end faces of a roll segment whereby the neighboring bearing plates of two roll segments are arranged one over the other perpendicular to the movement direction. The bearing plates have deep annular grooves in which end faces of the roll segments can rotate in a contactless manner. This arrangement enables each roll segment to be pressed individually against a wound roll and at the same time permits the gap between two neighboring roll segments to be held very small and thereby avoids markings on the wound rolls.

Description of the Invention

The invention has as its object to simplify structurally a roll system of the type described.

This object is attained in that the roll segments are each journaled only at one end face on a bearing pin which is mounted to project perpendicularly from a bearing plate which is movable perpendicularly to the rotation axis.

By the advantageous embodiment according to patent claim 2, each two roll segments are held by a common bearing plate from which the bearing pins project to opposite sides.

In order to hold the spacing between two roll segments as small as possible, in an especially advantageous embodiment according to patent claim 3, in at least in an inner side of each bearing plate, an annular groove is machined in which an end of a roll segment can rotate contactlessly.

The further dependent claims contain preferred and especially advantageous refinements of the invention.

Brief Description of the Drawing

The drawing serves for clarification of the invention based upon a simplified illustrated embodiment. The drawings thus show in

FIG. 1 the side view of a contact roll system according to the invention,

FIG. 2 a cross section broken away through a first embodiment in which the two roll segments are held by a common plate,

FIG. 3 a plan view of the contact roll system according to FIG. 2 and

FIG. 4 a cross section through a second embodiment in which each bearing plate carries only one roll segment.

Manner of Carrying Out the Invention

The contact roll system illustrated in the Figures is a component of a winding machine for winding up a continuous traveling material web 1, especially a paper web or a web of a plastic film or foil. The material web 1 subdivided by longitudinal cuts, is wound up on sleeves to wound rolls 2. The wound rolls 2 are mounted for the winding upon a common winding shaft or are each held by two clamping heads insertable into the sleeve. In order to prevent the penetration of air into the wound rolls 2, especially at high winding speeds, the winding machine has a contact roll system which is described in greater detail subsequently.

The contact roll system comprises a row of roll segments 3 arranged adjacent one another, end face to end face, and whose axial lengths are smaller than the minimum width of a wound roll 2. In the embodiment described, the length of a roll segment 3 is 50 mm to 150 mm. Each roll segment is either individually or as part of a pair together with a second roll segment, mounted so as to be movable perpendicular to its rotation axis 4. An individual roll segment 3 or a pair of two roll segments 3.1, 3.2 can thus press independently from the other roll segments against a respective wound roll 2 to permit diameter differences in the wound rolls 2 to be compensated.

Each roll segment 3 is journaled at one end face on a bearing pin 5 in a cantilevered manner, the bearing pin 5 projecting from a bearing plate 6 upon which it is fixed. The bearing plates 6 are movable perpendicularly to the rotation axes 4 of the roll segments 3, preferably by means of respective drives which are individual to the bearing plates. In the embodiment illustrated, the bearing plates 6 are shiftably mounted for movement back and forth with respect to the wound roll 2. For this purpose they have on their backsides turned away from the wound roll 2, a respective shank 7 with which they are slidably mounted in a linear guide 8, preferably a ball guide. The linear guides 8 are affixed to a traverse 9 which extends transversely over the working width of the wound machine. Thus ends of the bearing plates 6 with the roll segments 3 are mounted thereon are in turn

mounted on the common transversely extending traverse 9. A pneumatic piston and cylinder unit can serve as the drive for the shifting movement, and is on the one hand is affixed to a support plate 11 fastened to the traverse 9 and on the other hand is fixed to the back side of the bearing plate 6.

As an alternative to the linear mobility illustrated in the Figures, the bearing plates 6 can also be movably mounted on an arcuate track perpendicular to the rotation axis 4. The bearing plates can be mounted so as to be limitedly swingable, for example respectively, on rockers each assigned to one of the bearing plates 6.

As can be seen from the side view of FIG. 1, each bearing plate 6 ends at its side opposite the fastening end at a slight distance behind the bearing pin 5 secured thereto. This means that a roll segment 3 extends peripherally beyond the extent of the bearing plate 6. The region of contact with the wound roll 2 is thus maintained free from obstruction. A material web 1 running to a winding roll 2 can thus be so guided that it initially contacts a roll segment 3 and then the winding roll 2. This has advantages from a technological viewpoint with respect to the winding operation. Because of the bevels at the end of the bearing plate 6 turned toward the winding roll 2, the looping angle of the web 1 around the roll segment 3 can be adjusted independently of the winding direction and symmetrically for both possible winding

directions. The looping angle of the web 1 on a roll segment 3 amounts to 5° to 30°, preferably between 8° and 20°, for the best ability to wind the web while avoiding the entrainment of air into the roll by adhesion to the web 1.

Each roll segment 3 is comprised of an annular roll jacket 13 of metal upon which an outer running layer 14 of rubber is applied. At least at an inner side of each bearing plate 6, an annular groove 15 is machined concentric to the bearing pin 5. The curvature and outer dimensions of the annular groove 15 is so selected that the corresponding end of a roll segment 3 can project into it and can rotate in a contactless manner within the annular groove 15. The wall 16 remaining as the base of the groove 15 is made to be extremely thin since it defines the minimum distance between two neighboring roll segments 3. Preferably the thickness of the wall 16 amounts to 1 mm or less. The assembly has an axial free space between the end faces of the roll segments 3 and the wall 16 of about 0.2 mm to 2 mm and preferably about 0.3 mm. In spite of the minimum thickness of the wall 16, the requisite strength for supporting a roll segment 3 is provided since each bearing plate 6 is so shaped that the bending line must also run through thicker regions outside the groove 15. The annular groove 15 enables the requisite gap between two neighboring roll segments to be held very small. To avoid marking of sensitive webs 1, the gap should amount to less than 5 mm and preferably the gap is between 0.8 mm and 5 mm.

In the embodiment of FIGS. 2 and 3, two roll segments 3.1 and 3.2 are shown to be respectively journaled on both sides of a common bearing plate 6. For that purpose each bearing plate 6 has on each side a respective projecting bearing pin 5.1, 5.2 with a roller bearing 12 upon which a rolled segment 3.1, 3.2 is journaled so as to be freely rotatable. The bearing plates 6 have on both sides respectively an annular groove 15.1, 15.2 in each of which one roll segment 3.1, 3.2 supported by the bearing plate 6 is rotatable.

In FIG. 4 an embodiment of the invention has been illustrated in which each bearing plate has only one projecting bearing pin 5 on which roll segment 3 is journaled. The bearing pins 5 each have a respective flange with which they can be secured by screws to the bearing plate 6. With this embodiment, the bearing plate 6 has only on one inner side an annular groove 15 while the backside is planar and has a surface perpendicular to the axis of rotation 4. The bearing pin 5 and the annular grooves 15 are each located on the same side of the respective bearing plates 6 so that the free ends of the roll segments terminate at a slight distance from the rear wall of the neighboring bearing plate. In this embodiment as well, the thickness of the wall 16 at the base of the groove 15 defines the minimum distance of two roll segments 3 from one another. Since the bearing plate 6 has an annular groove 15 only at one side, it is simpler to fabricate.

In an embodiment which has not been illustrated, as in the embodiment of FIG. 2, each two roll segments 3.1, 3.2 are journaled on both sides of a common bearing plate 6. The bearing plate 6 is configured as has been illustrated for the embodiment of FIG. 4, with only one annular groove 15 on one side. On the back wall, without a groove, the second bearing pin 5.2 is affixed which carries the second roll segment 3.2. This embodiment has the advantage of the embodiment of FIG. 12, namely, that only one bearing plate 6 is provided for each two roll segments 3.1, 3.2. In addition, it utilizes a bearing plate 6 of the type shown in FIG. 4 which is simpler to fabricate since it has an annular groove 15 on only one side.

According to a preferred embodiment, two neighboring bearing plates 6 and thus roll segments held thereby can be mechanically so coupled together that the rotation axes 4 of the roll segments 3 exactly align. The roll segments 3 which are coupled together thus form a rigid combined pressing roll which can press with a common pressure against a winding roll 2. The contact lines of all roll segments 3 which are coupled with one another form an exact straight line or flush relationship. A coupling of two adjoining roll segments 3 has been found to be advantageous when, because of large thickness tolerances in the web, wound rolls 2 can develop excessively great differences in diameter at different zones. It is then undesirable that each roll segment 3 or each pair of roll segments 3.1, 3.2 match the actual diameter in

their respective pressing zones. A coupling 2 neighboring roll segments 3 is also advantageous when roll segment 3 with excessive axial length projects beyond wound roll and thus concentrates its pressing force only at the part of its length which is in contact.

As coupling elements, preferably switchable keys or locks 17 are used as has been shown diagrammatically in FIG. 1 and which may be movable parallel to the rotation axis 4 on the shank 7 of a bearing plate 6. The lock 17 can be actuated, for example magnetically or by a pneumatic cylinder to engage with its end in a corresponding opening of the shank of the neighboring bearing plate 6.